A PLAN FOR COORDINATING DEPARTMENT OF DEFENSE EMISSIONS TRADING

THESIS

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The views expressed in this thesis are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. Government.

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THESIS

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Preface

The original purpose of this research was to develop a plan to coordinate emissions trading between DoD installations. During the course of this research, findings indicated that restrictions on emissions trading would make such a plan of limited applicability. However, findings did indicate the need for a tool to assist managers with selecting the netting, offset, and banking emisssions trading alternatives. Developing this tool became the objective of this research.

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Charles H. Weir

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Abstract

The original purpose of this research was to develop a plan to coordinate emissions trading between DoD installations. During the course of this research, findings indicated that restrictions on emissions trading would make such a plan of limited applicability. However, findings did indicate the need for a tool to assist managers with selecting the netting, offset, and banking emissions trading alternatives. Developing this tool became the objective of this research. This objective was fulfilled by developing a management guide to assist environmental managers with selecting the emissions trading alternatives netting, banking, and offsets. Background information was collected by examining literature on Clean Air legislation and informal interviews with regulatory officials. The management guide was developed based on this information.

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I. Introduction

General Issue

Since its creation in 1970, the United States Environmental Protection Agency's (EPA) strategy for pollution control has primarily consisted of direct regulation of the "quantity of pollution allowed by individual sources or the control technology sources must use"(Anderson and others, 1990:1). This pollution control strategy is referred to as command and control. Command and control has achieved some success. "The Great Lakes are much cleaner today than in 1970, and bans on toxic substances such as DDT and PCBs represent significant environmental accomplishments" (Osborne and Gaebler, 1993:299). Although environmental quality has improved, it has come at considerable cost. EPA estimates that "American corporations, governments, and individuals were spending 115 billion dollars a year by 1990, to comply with federal environmental laws" (Osborne and Gaebler, 1993:299). Unfortunately, this price tag has only bought partial success. Air quality in many areas has still not achieved health-based air quality standards set by the 1970 Clean Air Act. Additional improvement under command and control will be difficult and more costly (Anderson and others, 1990:1).

In an effort to improve the nation's air quality, Congress passed the 1990 Clean Air Act Amendments (CAAA). The President's Council of Economic Advisors estimates that the annual cost to comply with the new law will reach about $25 billion annually by 2005 (Rosenberg, 1992:35) To reduce the cost of compliance with the CAAA of 1990, the new law encourages market based incentives such as emissions banking and trading (EPA, 1990:1).

EPA's Emission Trading Policy Statement issued in 1986 provided guidelines for emissions trading (EPA, 1986:43830). In addition, EPA provided individual policies regarding banking, netting, and offsets. The goal of these policies is to provide a mechanism to attain a specified level of air quality at least cost. These policies provide an organization with flexibility within the framework of the current command and control strategy to lower its air pollution control costs.

Specific Problem

The purpose of this research is to develop guidelines to facilitate emissions trading between DoD installations within the same air quality district.

Scope

This research will be applicable to DoD installations within the United States. It will focus on EPA's netting, offset, and banking policies. The research will focus on air emissions increases from new and modified major stationary sources and emission reductions at existing, new, and modified stationary sources.

Overview

This chapter briefly introduced emissions trading and its potential to lower costs to achieve air quality standards. The remaining chapters are as follows: Chapter II provides the background necessary to understand emissions trading. It discusses the legislative history of the Clean Air Act since 1970, command and control, emissions trading, potential DoD involvement in emissions trading, and a history of DoD emissions trading. Chapter III evaluates the advantages and disadvantages of using the offset, netting, and banking emissions trading activities. Chapter IV provides recommendations based on findings in chapter III, and provides recommendations for future research.

II. Background

Introduction

The purpose of this chapter is to provide the necessary background to understand emissions trading. In order to accomplish this objective, emissions trading must be considered within the overall context of the command and control strategy for air pollution control. This chapter will examine the legislative history of Clean Air legislation since 1970, EPA's traditional approach to air pollution control:command and control, emissions trading, the history of DoD emissions trading, and the potential impact of emissions trading on DoD installations in the future.

Legislative History

In 1970 the Clean Air Act (CAA) was signed into law by President Richard Nixon and the United States Environmental Protection Agency (USEPA) was established by executive order. An important provision of the 1970 CAA was the establishment of National Ambient Air Quality Standards (NAAQS) (Godish, 1985:214). NAAQS are:

> the maximum limits or concentrations of pollutants permitted in air. United States standards are based on estimates of maximum concentrations which, with an allowance for safety, present no hazard to health or the environment. (42 U.S.C., 1970:7409)

EPA established two kinds of NAAQS. Primary standards which protect human health and secondary standards which protect welfare:wildlife, vegetation, and materials (CCH, 1990:7). The 1970 CAA set a goal to achieve the NAAQS by July 1, 1975. To achieve these standards, EPA and the states specified emission limits and specified control technology for pollution sources (CCH, 1990:7). States describe these emission limits and control technologies in state implementation plans (SIPs). SIPs describe in detail how states plan to meet and maintain ambient air quality standards. They describe what sources of pollution will be regulated, how they will be regulated and how proposed regulations will impact emissions and air quality standards. SIPs must be approved by EPA. (Hahn and Hester, 1989:114). This strategy is commonly referred to as command and control (Hauser, 1993).

In 1977 Congress amended the CAA (CAA L&E, 1990:7). There were many areas of the country that had not achieved the NAAQS by the deadline set in the 1970 CAA. As a result, several provisions of the 1977 Clean Air Act Amendments were

- extending the deadline to achieve the NAAQS,
- designating areas of the country that had not achieved the NAAQS as nonattainment areas,
- establishing prevention of significant deterioration regions, and
- establishing an emission offset policy for nonattainment areas (Godish, 1985:215).

EPA designated areas of the country that had pollution concentrations that exceeded the NAAQS as nonattainment areas (Godish, 1985:220). EPA set timetables for nonattainment regions to achieve the NAAQS. The time al] wed to achieve the NAAQS was based upon the severity of the nonattainment. Areas of the country that had air quality better than the NAAQS were designated as attainment areas. EPA promulgated prevention of significant deterioration (PSD) regulations for these attainment areas. PSD regulations specified the levels to which attainment areas could allow air to deteriorate (Teitenberg, 1985:5-6).

The 1990 CAA was signed into law by President George Bush as Public Law 101-549 on November 15, 1990. This new law encourages the use of market based principles and other innovative approaches such as emissions banking and trading (EPA, 1990:1). These new approaches are aimed at reducing the cost to comply with the new law (EPA, 1990:1). The 1990 CAA classifies ozone nonattainment areas as either marginal, moderate, serious, severe, or extreme depending upon the severity of the pollution problem. Marginal areas are the areas closest to attainment and extreme areas are the furthest away from attainment (CCH, 1990:17).

Command and Control

Command and control has usually been accomplished by a regulatory agency establishing a separate emission standard for each point which discharges pollution. This method relies on the premise that if each source does not exceed its emission requirement, then air quality standards will be met (Aldrich, 1993:19). In order to achieve the standard, the regulatory agency must determine the maximum pollutant loading which can be assimilated for a particular air quality control region (AQCR). Based on this pollutant loading, the regulatory agency must then set emissions limits on each source in the AQCR such that the aggregate air quality standard is achieved (Aldrich, 1993:19).

Economists have found command and control results in an inefficient allocation of control costs. According to Teitenberg

> the fundamental problem with the command and control approach is a mismatch between capabilities and responsibilities. Those with the incentive to allocate the control responsibility cost effectively, the control authorities, have too little information available to them to accomplish this objective. Those with the best information on the cost-effective choices, the plant managers, have no incentive either to voluntarily accept their cost-effective responsibility or to transmit unbiased cost information to the control authority so it can make a cost effective assignment. (Teitenberg, 1985:16)

Atkinson and Lewis conducted an empirical study of command and control management of particulates for the St Louis metropolitan area. Atkinson and Lewis concluded that pollution control costs were three to five times greater than a theoretically efficient program offering the same level of ambient air quality (Kolstad, 1986:251).

Command and control provides very little flexibility for the polluter to meet air quality standards in a cost effective manner. Regulatory agencies specify control technologies thus negating the expertise of a plant manager to find more innovative cost effective methods to control pollution. In addition, command and control does not provide any incentive for the polluter to do better than the standard. Achieving emission reductions greater than required, usually results in additional cost. These additional costs provide no return under a command and control strategy (Teitenberg, 1985:16).

Emissions Trading

EPA's current guidance on emissions trading is based upon its Emissions Trading Policy Statement issued in 1986. The commodity exchanged in emissions trades is the emission reduction credit (ERC). The ERC is exchanged externally (between firms) or internally (within a single firm) (Hahn and Hester, 1989:113). Netting, offset, and banking govern how the ERC can be spent.

According to Teitenberg,

> ERCs can result in a cost-effective allocation of control costs because plants have very different costs

> of controlling emissions. When credits are transferrable, those plants that control most cheaply find it in their interest to control a higher percentage of their emissions because they can sell the excess. (Teitenberg, 1985:16)

In contrast to command and control, emissions trading "seeks to decentralize decisions about control technologies and allow a market to choose the most cost effective means of controlling pollution" (Pekeleny, 1993:13). Command and control relies on a regulator with incomplete information to develop cost effective standards. Emissions trading solves the problems of command and control by decentralizing pollution control decisions and creating incentives (Dudek and Palmisano, 1988:222).

Implementation of Emissions Trading

Emissions trading is implemented through individual policies. Three of these policies are offset, banking, and netting. Each policy is voluntary except the offset policy in nonattainment areas. This section discusses offset, banking, and netting emissions trading policies.

Offsets. This policy was specifically aimed at providing a means for continued growth in nonattainment areas. "Under the offset policy, major new or major modified existing sources obtain offsetting emission reduction credits from existing sources" (Anderson and others, 1990:16). The offsets are required to be in a ratio greater than 1. An offset ratio of 1.3 means that for every 1 ton of pollution emitted the facility must find reductions for 1.3 tons of pollution. A facility could shut down a source permanently or purchase emission reduction credits to achieve this ratio (Anderson and others, 1990:16).

Banking. Emissions credit banking is the process of storing emission reduction credits in EPA approved banks for future use in bubble, netting, or offset transactions (EPA, 1986:43831). Banking enables firms to plan their use of emission reduction credits. Planning is critical since it takes months to create emission reduction credits (Dudek and Palmisano, 1988:228). Banking emission reduction credits is not without risks. Emission reduction credits are not property. Credits may be discounted, reduced or eliminated by state regulators in the event of future state implementation plan (SIP) corrections, or changes in ambient air status (Anderson, 1990:17).

Netting. Netting is a bookeeping mechanism that tracks emissions increases and decreases from modifications to major sources to determine whether a significant net emissions increase will result from the modification (ETI, 1993:63).

> Netting may exempt modifications of existing major sources from certain preconstruction permit requirements under New Source Review (NSR), so long as there is no net increase within the major source, or such increase falls below significance levels. (EPA, 1986:43830).

According to Anderson and others, "netting allows the firm to reduce emission control costs when classification as a major source would subject the firm to more stringent emission limits (Anderson and others, 1990:17). An organization also saves by avoiding the major source permitting process (Anderson and others, 1990:17).

New Source Review

New Source Review (NSR) is the process of evaluating new major sources, and modifications to existing major sources that result in a significant increase in emissions, for an application for a federal, state, or local permit to construct (ENSR, 1988:98). A significant increase is a threshold level of emissions determined by the regulatory agency which may have a significant impact on air quality (Quarles and Lewis, 1990:23). Currently EPA defines significant as:

> a net emissions increase of 100 tons per year (tpy) of carbon monoxide, 40 tpy of nitrogen oxides, 40 tpy of sulfur dioxide, ozone: 40 tpy of volatile organic compounds, and .6 tpy of lead. (40 CFR 51.165)

Sources undergoing NSR are evaluated for a permit in a step-by-step procedure which may include ambient air monitoring and mathematical modeling to determine the air quality impact of the new or modified source (ENSR, 1988:99). Sources classified as major or major modification in nonattainment areas must obtain construction permits, emission offsets, and install lowest achievable emission rate (LAER) technology. LAER is defined as:

> either the most stringent emission limit contained in any state implementation plan for the applicable category of sources, or the most stringent emission limitation achieved in practice within an industrial category. (CCH, 1990:13)

EPA mandates less stringent controls for major new sources and major modified sources in attainment areas. In attainment areas, EPA mandates the use of best available control technology (BACT). BACT standards are usually less stringent than LAER, and

> are determined at the state level as a yardstick for licensing the construction of big new facilities that could be major sources of pollution. BACT is the best available means being used by industry in general in new construction. (CCH, 1990:13)

Emission reduction credits are used in netting transactions to assist existing sources with avoiding the new source review process. Emission reduction credits are also used to offset emissions from major and major modified sources in nonattainment areas.

DoD Emissions Trading History

Two cases in the early 1980's were documented by Cunningham and Davis, and reported also by Martin Savoie. These two cases were at Lemoore Naval Air Station (NAS), near Hanford California, and at Norfolk Naval Shipyard Virginia (Cunningham and Davis). "Lemoore NAS tried to obtain offsets for nitrogen oxides (NOx) emissions from an aircraft engine test cell. The Norfolk Naval Shipyard case involved particulate emissions from eight boilers. Neither case was successful" (Savoie, 1993:9).

Savoie also noted two recent cases of emissions trading. One case involved an unsuccessful attempt to trade emission reduction credits between March AFB, California and Norton AFB, California. The second case was successful and involved McClellan AFB, California and Mather AFB, California. Both cases involved the transfer of emission reduction credits from closure bases:Norton AFB and Mather AFB to bases gaining missions from the closure bases.

In 1990, March AFB attempted to acquire emission reduction credits from Norton AFB. March AFB and Norton AFB are located approximately 20 miles apart in Southern California. Both bases are located within the South Coast Air Quality Management District. March AFB was scheduled to receive the 63rd Military Airlift Wing from Norton AFB. March AFB needed emission reduction credits to offset the additional air emissions associated with the support equipment of the 63rd Military Airlift Wing. Despite being within the same air quality management district, and only approximately 20 miles apart, the South Coast Air Quality Management District denied the emission reduction credit transfer. The transfer was denied because March AFB was not in a compatible zone for emissions trading with Norton AFB. Compatible zones in the South Coast Air Quality Management District are determined by wind direction and other meterological factors (Savoie, 1993:10 and Lam, 1993).

> Therefore, March AFB had to buy credits from the open market for nitrous oxides and ozone to offset emissions from equipment supporting the transferred aircraft. March bought ERCs for nitrous oxides and ozone totaling about 238 lb/day (43.4 tons/yr) at a cost of $1,012,000. This was the most money ever paid for ERCs in the United States. The average cost of the ERCs was about $12/lb ($24,000/ton). (Savoie, 1993:10)

Mather AFB and McClellan AFB are both located in the Sacramento, California metropolitan area. Mather is approximately 15 miles south of McClellan. Both bases are within the jurisdiction of the Sacramento Metropolitan Air Quality Management District. The 940th Air Refueling Group was moved from Mather AFB, California to McClellan AFB, California. To offset the increase in air emissions associated with the new mission, McClellan AFB acquired emission reduction credits from Mather AFB (Savoie, 1993:10). The Sacramento metropolitan area is nonattainment for ozone, carbon monoxide, and PM 10. The emission reduction credit transfer from Mather AFB to McClellan AFB was approved by the Sacramento Air Quality Management District (Carroz, 1993).

The attempted emissions trade from Norton AFB, California to March AFB, California is significant because both bases are located within the South Coast Air Quality

Management District and within 20 miles of each other. Yet, Norton AFB could not transfer credits to March AFB. Although emission reduction credits may be available, they may not necessarily be transferrable.

Future of DoD Emissions Trading

The future of DoD emissions trading potential will be affected by several factors. These factors are base closure and realignment, pollution prevention initiatives, and the degree to which market based incentive programs are adopted by air pollution control authorities. This section will discuss each of these issues.

Base Closure and Realignment. Closed bases represent a potentially significant source of emission reduction credits. Emission reductions that result from the shutdown of operations at closure bases are categorized by Air Force policy as federal property for internal management purposes. Emission reduction credits are further subdivided as operational needs requirement ERCs, related personal property ERCs, and personal property ERCs (USAF, 1993:1).

ERCs needed to fulfill operational requirements at another base in the same Air Quality District (AQD) or another AQD are categorized as operational needs requirement ERCs. ERCs are classified as related personal property if the removal of these credits from the closure base would significantly diminish the value of the property if not transferred with real property. Any ERCs left after operational needs requirements and related personal property ERCs are considered personal property ERCs (DAF, 1993:1-2).

Although closure bases potentially represent a significant source of ERCs, they may not always be available for transfer to other installations. The community reuse plans of the closure base will have an impact on the availability of ERCs for transfer to other installations (Smith, 1993).

Pollution Prevention. Air Force Policy Directive 19-4, Pollution Prevention, outlines pollution prevention objectives. The objectives are to eliminate or reduce to as near zero as feasible, hazardous substance use and waste releases into the environment. Additional benefits from pollution prevention initiatives may be the generation of ERCs (DAF, 1992:1).

Incentive Programs. The 1990 CAA encourages states to adopt incentive programs to control air pollution. EPA also mandates the use of incentive programs in some instances. Specifically, EPA mandates the implementation of an economic incentive program (EIP) upon the failure of a state to meet reasonable further progress milestones toward attainment in extreme ozone nonattainment areas. EPA also identifies an EIP as one of three options for serious and severe ozone nonattainment areas, and serious carbon monoxide nonattainment areas (EPA, 1993:11110-11111).

Conclusion

The command and control strategy for air pollution control has not been successful at creating incentives to reduce pollution. Also, this strategy has only been partially successful at achieving the National Ambient Air Quality Standards. In theory, emissions trading should create incentives and provide sources the flexibility within the existing command and control strategy to lower compliance costs (Walsh, 1992:2). These sources have additional flexibility from emissions trading because they can choose to control air pollution or purchase emission reduction credits from sources that have lower marginal costs to control pollution.

III. Findings

Overview

The original purpose of this research was to develop a plan to coordinate emissions trading between DoD installations. However, there were several significant findings that changed the direction of the research such as: trading is restricted based on distance and wind direction between sources (Young, 1993), only emission reduction credits (ERCs) resulting from emission reductions at the same source may be used in netting transactions (Hahn and Hester, 1989:136), and some credits at closure bases will be reserved to enhance the property value at those closure bases (DAF, 1993:1). Therefore, a plan to trade emission reduction credits between DoD installations would have only limited applicability. However, the findings indicated the need to provide a tool to evaluate the advantages and disadvantages of the banking, netting, and offset policies, to provide managers a basis for applying these policies.

This chapter addresses two objectives. The first objective is to evaluate the advantages and disadvantages of the banking, netting, and offset policies and provide a demonstration of the application of banking, offsets, and netting using hypothetical examples. The second objective is to develop a management guide for making decisions when considering the banking, netting, or offset alternatives. This guide provides step-by-step procedures for selecting each alternative and provides examples of netting, banking, and offsets.

Banking

Banking consists of creating ERCs from surplus emission reductions and storing these credits for future use in EPA approved banks (EPA,1986:43830). ERCs are the commodity traded in netting and offset transactions (Teitenberg, 1985:7) and are created by reducing emissions below a baseline specified by the air pollution control authority (APCA). Some of the common actions that result in permanent emission reductions are:

1. Base Closure and Realignment
2. Pollution Prevention
3. Process changes
4. Equipment upgrades
5. Fuel switches to cleaner burning fuel
6. Process or equipment shutdown

Applications for ERCs should be made to the air pollution control authority as soon as possible after emission reductions are made. Applications must be filed within the timeframe specified by the APCA or the application is automatically denied. Converting emission reductions to ERCs requires three steps: qualification, quantification, and certification.

Qualification. Each APCA with a banking rule determines:

1. What types of emissions reductions qualify for banking.
2. What sources are eligible to bank emissions reductions.

Qualification requirements are specified in the applicable APCA regulations (EPA, 1980:10) with exceptions evaluated on a case by case basis. To qualify for emission reduction credit, an emission reduction must be surplus, enforceable, permanent, and quantifiable. EPA defines each criterion as:

> 1. Surplus: At minimum, only emission reductions that are not required by current regulations in the State Implementation Plan (SIP), not already relied on for SIP planning purposes, and not used by the source to meet any other regulatory requirement can be considered surplus. To determine the quantity of emission reductions that are surplus, the state must first establish an appropriate emission baseline from which surplus reductions can be calculated. (EPA, 1986:43832)
>
> 2. Enforceable: To assure that Clean Air Act requirements are met, each transaction which revises any emission limit upward must be legally binding and enforceable in the courts and by the regulatory agency. (EPA, 1980:10)
>
> 3. Permanent: Only permanent reductions in emissions can qualify for credit. Permanence may generally be assured by requiring changes in source permits or applicable state regulations to reflect a reduced level of allowable emissions. (EPA, 1986:43832)
>
> 4. Quantifiable: Emission reductions must be quantifiable both in terms of estimating the amount of the reduction and characterizing that reduction for future use. (EPA, 1986:43832)

Quantification. After the source and pollutant have been determined eligible for emission reduction credit, the emission reduction must be quantified. The methodology used to compute the reduction must be approved by the APCA (EPA, 1980:16). The reduction is usually computed by subtracting actual emissions from a baseline determined by the APCA. The baseline may be based on actual or allowable emissions. Allowable emissions may be used if the state has an approved state implementation plan (Mosier, 1993). Hahn and Hester note that calculating the amount of surplus emission reductions is often a difficult task either because of ambiguity about the baseline or due to lack of data on emissions or both (Hahn and Hester, 1988:116).

Certification. Next the emissions reduction must be converted to an ERC by the APCA. The magnitude of the ERC may be less than the actual emission reduction. The conversion ratio is specified in the rules for each APCA. When the ERC certification is issued, a new permit is issued reflecting the new level of permitted emissions making the emission reduction enforceable (EPA, 1980:19-21).

Banking ERCs aids facilities in planning expansion. By having ERCs on hand (in inventory) facilities can save ERCs for when they need them. Planning is essential because considerable lead time is needed to reduce emissions and create an ERC. The APCA may take up to six months just to evaluate the application (Young, 1993). However, regulatory changes that lower emission standards can create uncertainty regarding the quantity of ERCs that may be used for future emissions trades. Banked ERCs represent surplus emission reductions that may be used in the future, but regulatory changes can essentially redefine these banked ERCs as all or partially no longer surplus (Hahn and Hester, 1988:117). States may confiscate, discount, or place a moratorium on the use of ERCs (EPA, 1980:26). This uncertainty can be estimated by assessing progress on reasonable further progress milestones, status of the state implementation plan, and communicating with regulatory officials.

Using ERCs at the same location in which the emission reduction occurred offers more flexibility than ERCs acquired from other sources. ERCs generated from emission reductions at the same location may be used in netting or offset transactions at that location. ERCs generated from emission reductions at other locations may not be used in netting transactions but may be used in offset transactions. This distinction is very significant because netting is the mechanism that allows sources to avoid a long, costly new source review process. According to Anderson netting also "appears to be the most commonly used emissions trading activity" (Anderson and others, 1990:17). In some cases, ERCs created at external sources have reduced value, and in other cases, may not be transferrable (Young, 1993; Lam, 1993). The APCA may reduce the value of ERCs from external sources by requiring more ERCs from an external source than from an internal source to offset the same level of emissions increase. Also, ERCs may only be transferrable between certain geographic areas. Managers must check with the applicable APCA to determine if restrictions apply to ERC transfers.

Benefit/Cost. The benefit from the use of the ERC must be weighed against the cost of creating the ERC. Costs in addition to new control technology include, collecting emissions data, completing the ERC application, and paying the application fee. A sample ERC application is provided at appendix B.

Netting

Netting is the most frequently used emissions trading activity (Hahn and Hester, 1989:137). This activity utilizes only internal trades: trades from within the same plant. Netting allows major existing sources to avoid an extensive permitting process under New Source Review (NSR). Existing sources can streamline NSR by keeping emissions below significant threshold levels. Significant threshold levels represent levels at which emissions may pose a significant impact on air quality. Managers usually consider two options to stay below the significance threshold. These options are internal trades and installing emission controls. Since investment decisions consider risk, the choice between internal trades and emission controls is not a strictly least cost decision. Uncertainty, time to get regulatory approval, and the transaction costs associated with ERCs can make installing emission controls the preferred option even if ERCs are less costly (Anderson and others, 1990:18).

Advantages. Netting allows firms to avoid costs in two ways. The firm reduces compliance costs because a modification to a major source that is classified as major modification would subject the firm to more stringent, and more costly, emissions standards. Savings are also realized by avoiding ambient air monitoring and modeling costs associated with obtaining pre-construction approval in the NSR process (Quarles and Lewis, 1990:71). Hahn and Hester estimate savings at $100,000 to $1,000,000 per source (Hahn and Hester, 1989:135). Additionally, by avoiding classification as a major modification, construction delays can be reduced. The major source permitting process can take from 6 to 42 months (ENSR, 1988:98). The length of the permit process depends upon the complexity of the project and whether the source is located in a nonattainment or attainment area.

Disadvantages. Although netting permits significant cost savings, its application can be difficult. According to Quarles and Lewis, netting "typically imposes a horrendous problem of data analysis and accounting" (Quarles and Lewis, 1990:73). This problem is experienced in establishing the baseline for calculating the increase for the proposed modification. EPA uses a two year period of actual emissions to establish the baseline. Emissions from the proposed modification are based on the maximum potential to emit. The maximum potential to emit is usually based on 24 hour operation every day of the year (Quarles and Lewis, 1990:73). A lesser operating period for calculating the maximum potential to emit may be negotiated in some cases, but becomes an enforceable element of the permit (Young, 1993).

Offsets

The offset program is a mandatory program. All modified major sources and new major sources in nonattainment areas must obtain emissions offsets to obtain preconstruction permits. The offset must be an emission reduction greater than the emissions increase. Major sources and major modifications are determined by emissions that equal or exceed specified threshold levels (Quarles and Lewis, 1990:23). When net emissions increases from modified major sources equal or exceed significant threshold levels, the entire increase must be offset. This threshold level establishes the relationship between netting and offsets for major sources undergoing modification. Sources attempt to "net out" to avoid having to offset the net emissions increase.

Most offset trades have been internal (Dudek and Palmisano, 1989:225). In internal trades, facilities use ERCs created from emission reductions at their own facilities.

The 1990 CAA made several changes that may significantly impact the availability of ERCs. The Act made major source definitions more stringent in serious, severe, and extreme ozone nonattainment areas by lowering the threshold level of emissions (Quarles and Lewis, 1990 :73).

The CAA also increased the level of emissions decrease required to offset an emissions increase in nonattainment areas. EPA specifies the levels that emissions increases from major sources and major modified sources must be reduced by using ratios. A ratio of 1.1 to 1 means that every unit of emissions increase must be offset by an emissions reduction of 1.1 units. The 1990 CAA increased the ratios that emissions from major sources must be offset in ozone nonattainment areas. Volatile organic compounds and nitrogen oxides emissions must be offset in ozone nonattainment areas (Quarles and Lewis, 1990:74).

The level of nonattainment can be an important consideration. Nonattainment areas furthest away from attainment must offset emissions increases with higher levels of emissions decreases. Table 4 lists EPA's offset ratios for nonattainment areas. In an extreme nonattainment area, which is furthest away from attainment, an emissions increase of one unit must be offset by an emissions decrease of 1.5 units. Air Force installations that may be impacted by higher offset ratios and lower major source thresholds are listed in Tables 1-3.

Table 1

Air Force Installations Located In Ozone Nonattainment Areas

Marginal
- MacDill AFB, FL
- Langley, AFB, VA

Moderate
- Onizuka AFB, CA
- Vandenberg AFB, CA
- Travis AFB, CA
- Scott AFB, IL
- Luke AFB, AZ
- Wright Patterson AFB, OH

Moderate
- McChord AFB, WA
- Homestead AFB, FL

Extreme
- Los Angeles AFB, CA
- March AFB,CA
- Norton AFB, CA
- George AFB, CA

Serious
- Edwards AFB, CA
- McClellan AFB, CA
- Mather AFB, CA
- Castle AFB, CA
- Andrews AFB, MD
- Bolling AFB, DC
- Hanscom AFB, MA
- Dobbins AFB, GA

Severe
- Dover AFB, DE
- McGuire AFB, NJ

Transitional
- Beale AFB, CA
- Lowry AFB, CO

Table 2

Air Force Installations Located In Carbon Monoxide Nonattainment Areas

Moderate

Elmendorf AFB, AK
Luke AFB, AZ
McClellan AFB, CA
Lowry AFB, CO
McChord AFB, WA

Fairchild AFB, WA
Andrews AFB, MD
Hanscom AFB, MA
Nellis AFB, NV
Davis Monthan AFB, AZ
Bolling AFB, DC

Eielson AFB, AK
Hill AFB, UT
Mather AFB, CA
Onizuka AFB, CA

Serious

March AFB, CA
Norton AFB, CA
George AFB, CA
LA AFB, CA

Table 3

Air Force Installations Located In PM-10 Nonattainment Areas

Moderate

Luke AFB, AZ
March AFB, CA
Norton AFB, CA
George AFB, CA
Los Angeles AFB, CA
Lowry AFB, Co
McChord AFB, WA
Fairchild AFB, WA

Offset ratios for ozone nonattainment are shown in Table 4.

Table 4

Offset Ratios In Ozone Nonattainment Areas

Category	Offset Ratios
Marginal	1.1:1
Moderate	1.15:1
Serious	1.2:1
Severe	1.3:1
Extreme	1.5:1

Adapted from (EPA, 1990:11-13)

Managers planning facility expansion at installations, especially for installations located in nonattainment areas, must consider major source thresholds and emissions offset ratios if applicable. More stringent requirements under the 1990 CAAA for offset ratios and major source definitions will raise the likelihood that a new source or a modification to a major source will be considered major. Obtaining a permit to construct for a major source, especially in a nonattainment area, may require a long lead time and a large cash outlay.

Management Guide

This section proposes a management guide to assist environmental managers in making decisions when considering the banking, netting, or offset alternatives. The guide provides step-by-step procedures for selecting each alternative and provides examples of netting, banking, and offsets.

Emissions Trading Decision Map. The purpose of this decision map is to provide environmental managers with a tool to assist them in selecting the netting, banking, and offset alternatives. Emission increases that result from new major sources and modifications to existing major sources may require emissions offsets. The decision process for determining whether emissions offsets are required is outlined beginning with figure 1 continuing to figure 4. Each figure is followed by step-by-step instructions to guide the user through each alternative.

Netting may be an option for existing major sources undergoing modification. Netting may allow existing major sources to streamline the time required and the cost of obtaining a permit to construct. This option is outlined starting with figure 1 continuing to figure 2.
Figure 1 is the starting point for the decision process for an emissions increase that requires a permit to construct.

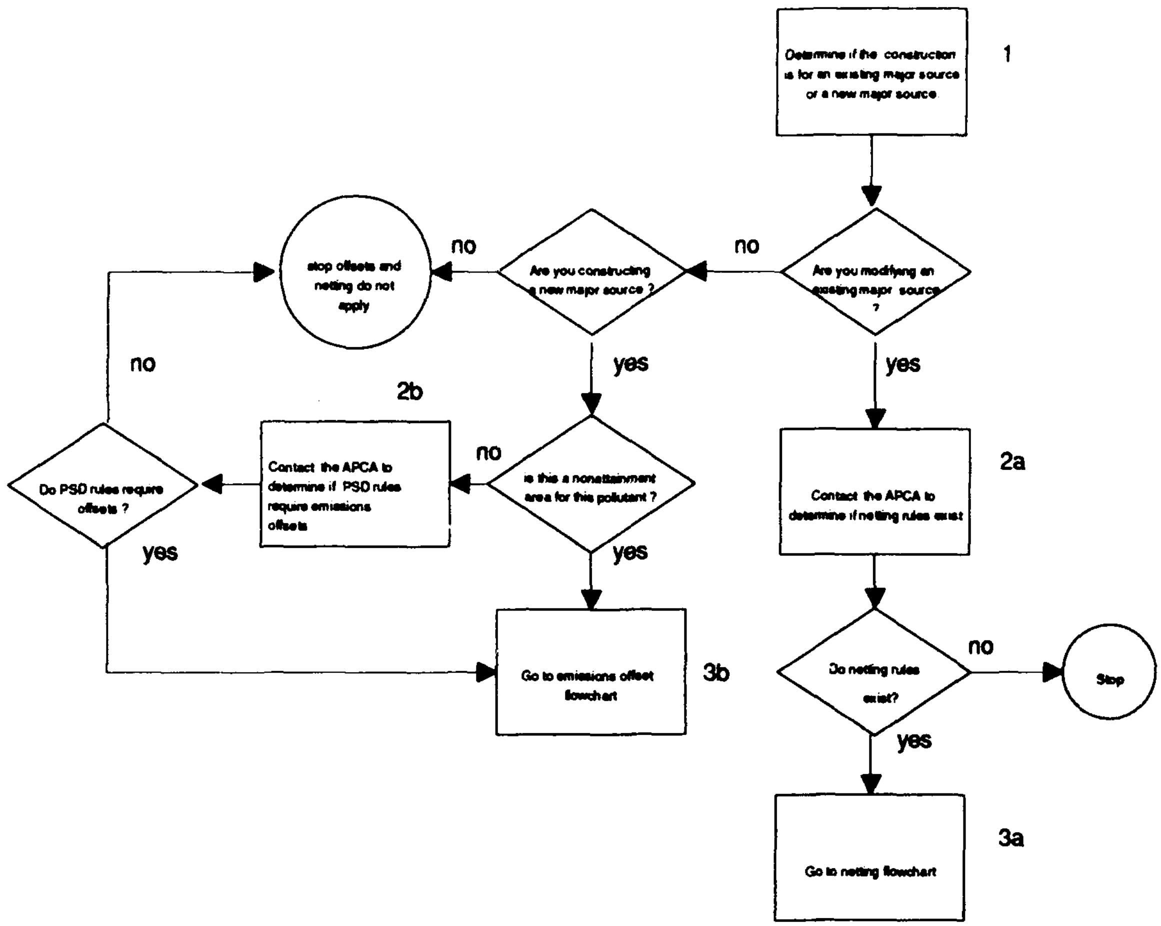

Figure 1. Emissions Increase Flowchart

Step 1. Determine if the source is a new major source or an existing major source. If the source is not a new major source or an existing major source, offsets and netting do not apply.

Step 2a. Contact the APCA to determine if netting rules have been adopted. If netting rules have not been rules have been adopted. If netting rules have not been adopted, determine what permitting procedures the APCA requires. If netting rules have been adopted, continue to the netting flow diagram.

Step 2b. Determine if this is a nonattainment area for the pollutant(s). If not, go to step 3.

Step 3. Contact the APCA to determine if Prevention of Significant Deterioration (PSD) rules require offsets. EPA does not require offsets in attainment areas, but states have the option to require offsets.

Step 4a. Go to netting flowchart.

Step 4b. Go to offset flowchart.

The decision process for netting is outlined in figure 2.

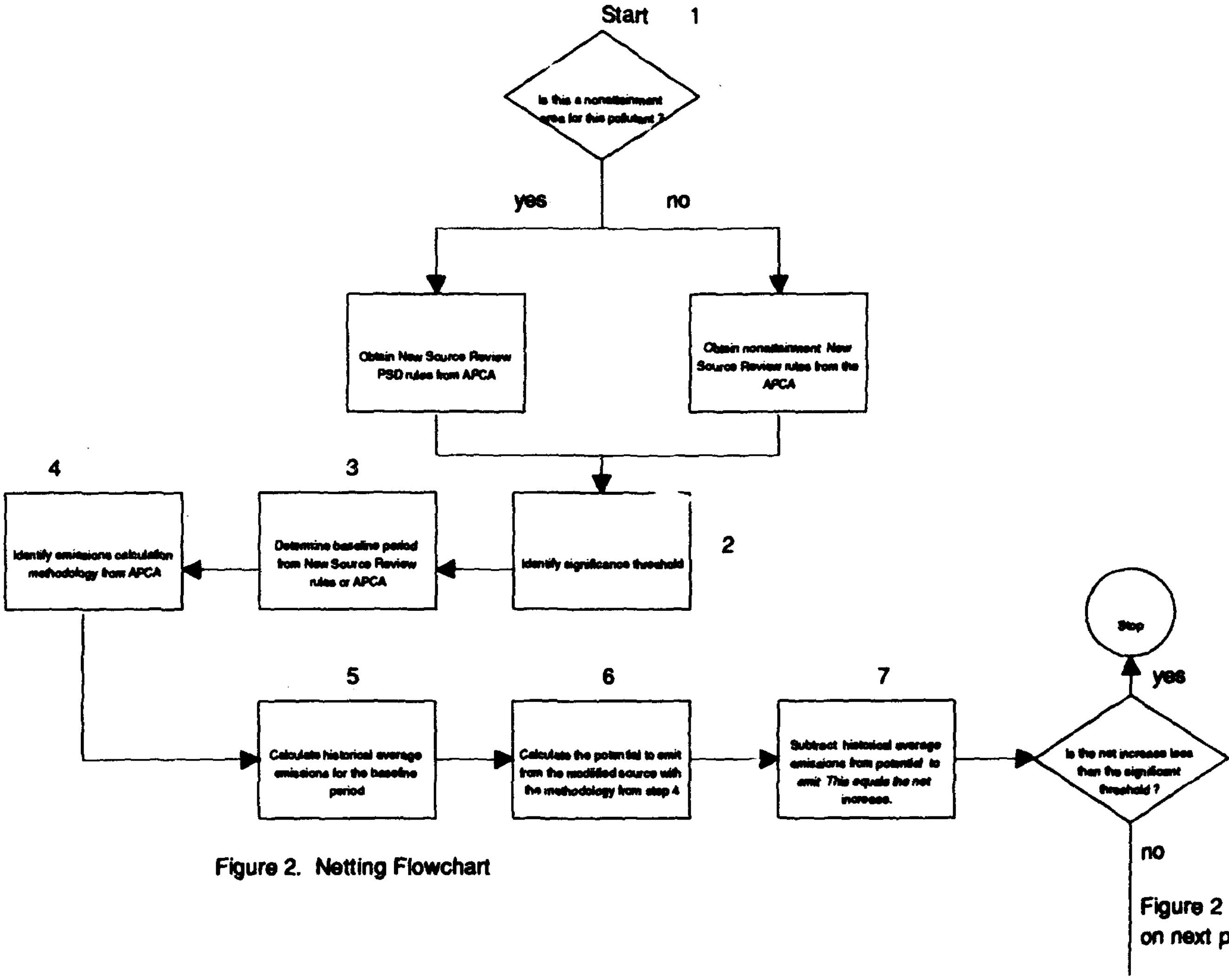

Figure 2. Netting Flowchart

Figure 2 cont. on next page

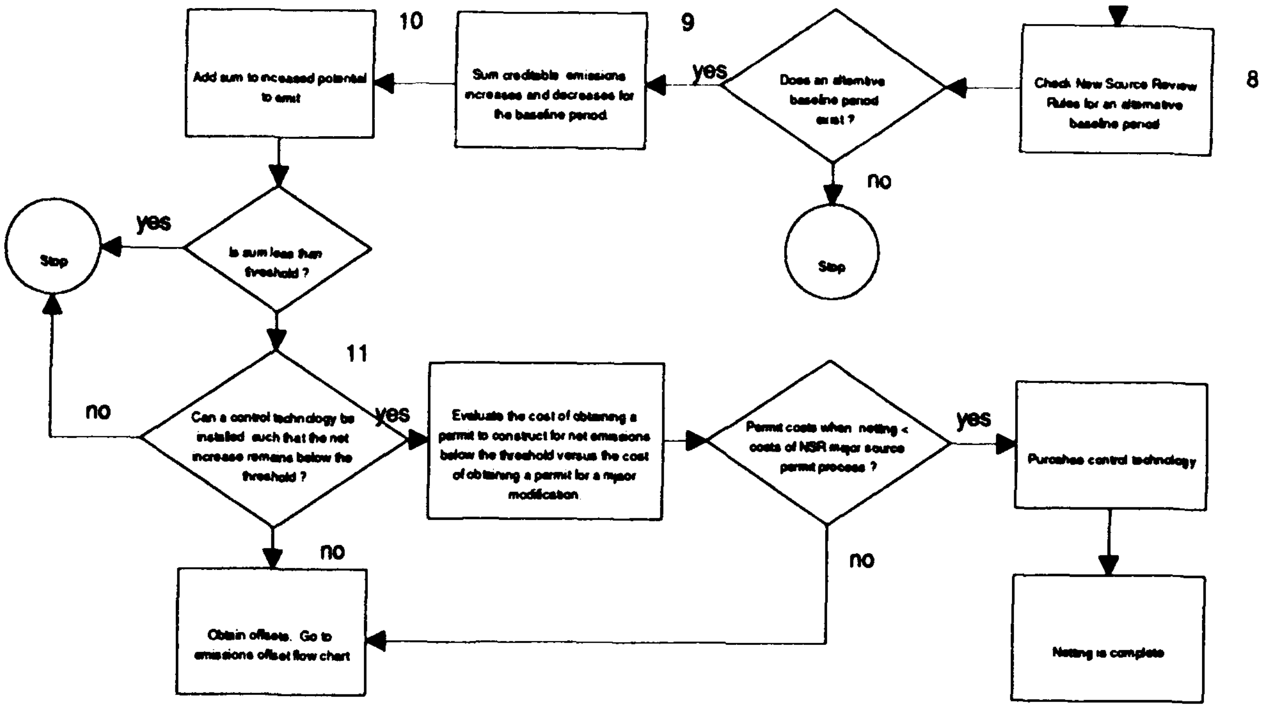

Figure 2. Netting Flow Chart

The netting process contains the following steps.

Step 1. Obtain New Source Review rules for attainment or nonattainment depending on the nonattainment/attainment status of the area for the particular pollutant.

Step 2. Identify the significance threshold. If the net emissions increase equals or exceeds this threshold, the modification is major.

Step 3. Determine the baseline period. The potential to emit from the modified source will be measured against the historical average emissions for this period.

Step 4. The APCA determines how the emissions will be calculated for the historical emissions baseline and the potential to emit from the modified source.

Step 5. Calculate the historical average emissions for the baseline period.

Step 6. Calculate the potential to emit from the modified source with the emissions calculation methodology prescribed by the APCA.

Step 7. Subtract the historical average emissions for the baseline period from the potential to emit. If the net increase is less than the threshold, the modification is not considered major, therefore the netting process is complete. If the potential to emit equals or exceeds the threshold, an alternative baseline period may or may not be an option.

Step 8. Check the New Source Review rules for an alternative baseline period. If an alternative baseline is not an option, the netting process is complete. The modification is major.

Step 9. Sum creditable emissions increases and decreases for the baseline period. Creditable increases are emissions increases from past modifications or other events which resulted in a permanent emissions increase. Creditable decreases include emission reduction credits and other decreases (i.e. taking equipment offline, process changes, fuel switches). The APCA should have a record of all creditable increases and decreases.

Step 10. Add the sum of step 9 to the increased potential to emit from step 6. If the sum is less than the threshold, the modification is not major and the netting process is complete.

Step 11. A pollution control technology may be available that reduces the net emissions increase below the significant threshold. If a control technology is available, the costs of obtaining a permit to construct, including installing this technology, should be weighed against the cost of obtaining a permit to construct for a major modification. If the net increase equals or exceeds the significance threshold, Best Available Control Technology (BACT) in attainment areas, and Lowest Achievable Emissions Rate (LAER) technology in nonattainment areas will be required by the APCA to obtain a permit for a major modification to an existing source. It may be beneficial to install a control technology even BACT or LAER to avoid the additional costs of modeling, monitoring, and preconstruction delays associated with obtaining a permit to construct for a major modification.

Certain emission reductions may qualify for emission reduction credit (ERC) and may be banked for future use. The decision process for selecting this alternative is outlined in figure 3.

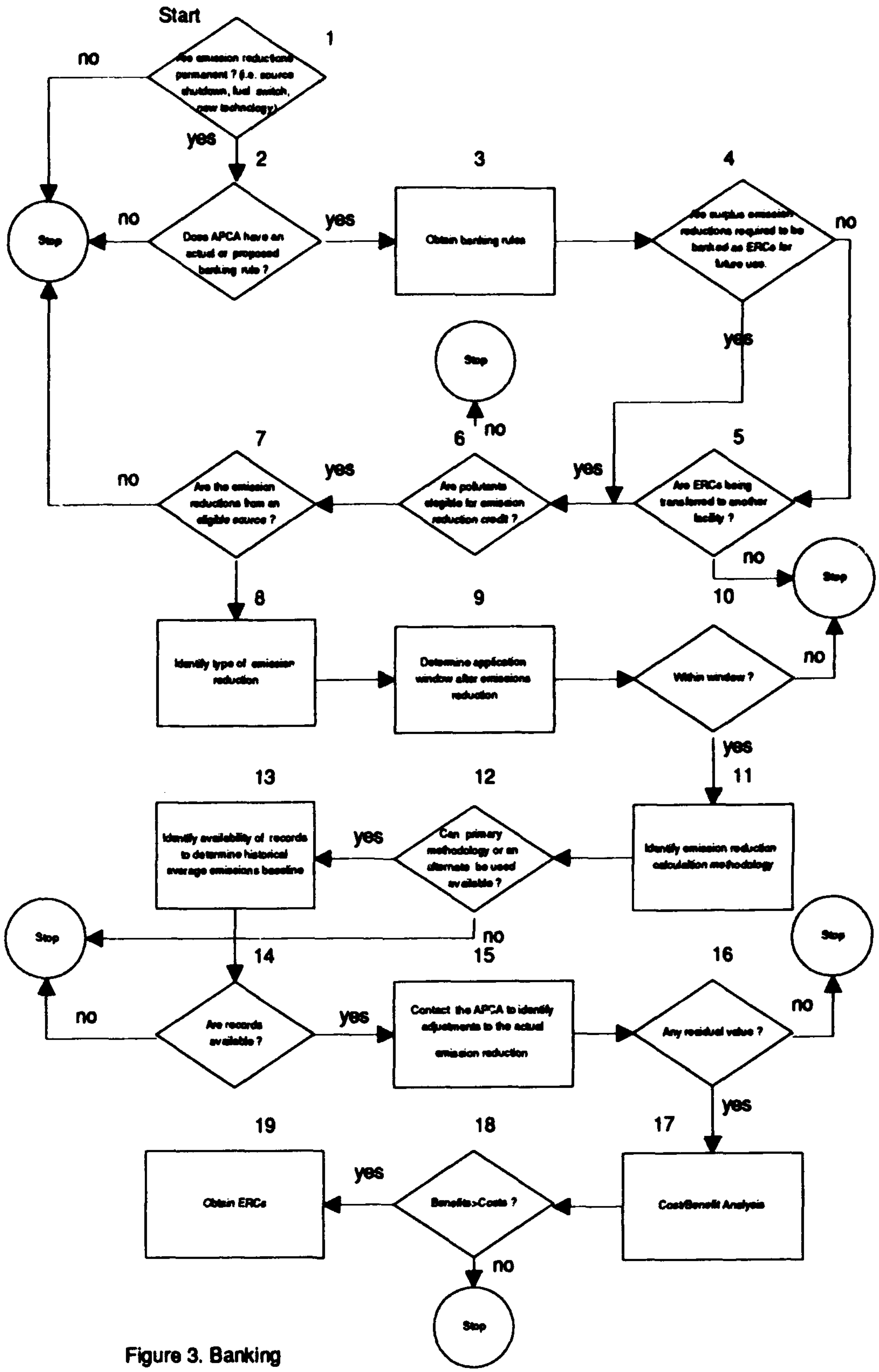

Figure 3. Banking

Step 1. Permanent emission reductions result from, but are not limited to, events such as source shutdown, equipment upgrades, pollution abatement equipment, and permanent reductions in operating hours. If the emission reduction is permanent it may be eligible to be banked as an emission reduction credit (ERC).

Step 2. Determine if the APCA has a banking rule.

Step 3. Obtain the banking rules.

Step 4 and 5. Surplus emission reductions are not always required to be banked for future use in netting transactions, but are almost always required to be banked for transfer to another facility. If surplus emission reductions are not required to be banked for future use, and are not going to be transferred to another facility as ERCs, there is probably no need to pursue banking.

Step 6. Pollutants must be eligible to receive emission reduction credit. This information can be obtained from the banking rule.

Step 7. Emission reductions must be from an eligible source as determined by the APCA.

Step 8. The type of emission reduction must be identified. Some examples are source shutdown, fuel switch, process changes, and a permanent reduction in equipment operating hours.

Step 9 and 10. Applications for emission reduction credits must be submitted within the timeframe specified by the APCA after the emission reduction.

Step 11 and 12. The APCA must approve the methodology for calculating the reduced potential to emit and the methodology for calculating the average emissions baseline.

Step 13 and 14. Based on the approved methodology, records must be available to calculate the historical average emissions baseline.

Step 15 and 16. The emissions reduction may be reduced beyond the actual emissions reduction. Adjustments may be made by applying a more stringent control technology than was used on the equipment, resulting in an emissions reduction less than the actual emissions reduction.

Step 17 and 18. Evaluate the costs of obtaining the emission reduction credits versus the benefits derived from the use of the emission reduction credits. Costs include the cost of time to prepare the application, application fee, and other administrative costs determined by the application process of the specific APCA.

Figure 4 outlines the decision process for emissions offsets.

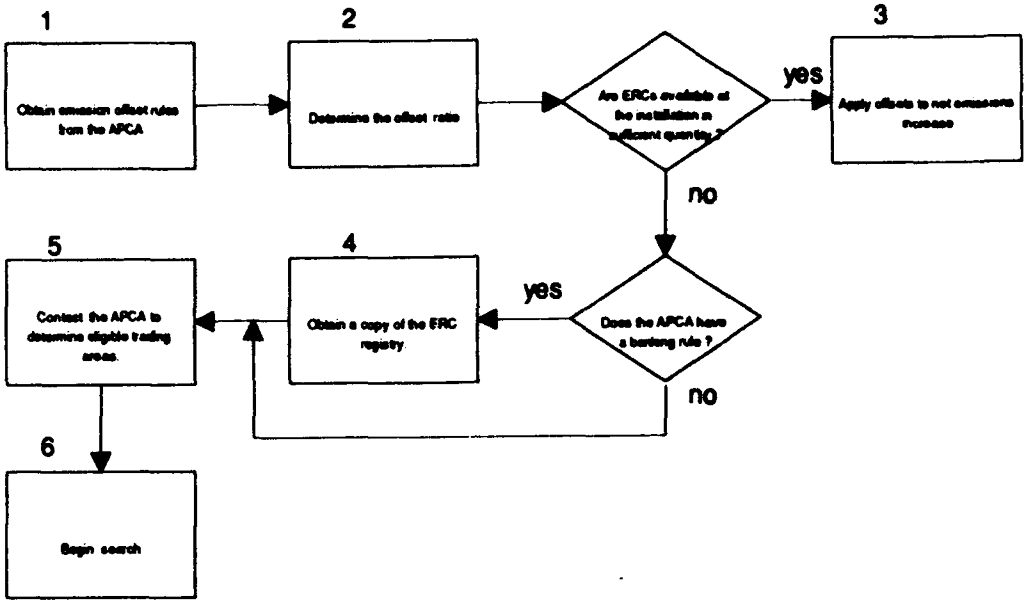

Figure 4. Offset Flow Chart

Step 1. Obtain emissions offset rules from the APCA.

Step 2. Determine the offset ratio. The offset ratio determines the ratio of emissions increase to emissions decrease required to receive a pre-construction permit. Emissions decreases must be greater than emissions increases.

Step 3. Apply the offsets to the net emissions increase. An offset ratio of 1.3 to 1 would result in required offsets of 1300 pounds of ERCs for 1000 pounds of net emissions increase.

Step 4. Obtain a copy of the ERC registry. All states with a banking rule are required by EPA to maintain a registry. The registry is a listing of emission reduction credits by location.

Step 5. Trading may or may not be restricted to certain areas. Contact the APCA to determine eligible trading areas.

Step 6. Begin search.

Examples. Emissions trading is often restricted based on the distance and wind direction between sources. Also there is often a difference between the amount of the emission reduction and the emission reduction credit. These examples demonstrate what effect these factors may have on deciding to select netting, banking, or offsets.

Netting. This example uses Regulation IX-3, Emission Offsets, from the Indianapolis Air Pollution Control Board. The plant is located in a marginal nonattainment area for ozone with an offset ratio of 1.1 to 1. The volatile organic compound (VOC) threshold for significant net emissions increase is 40 tons per year (tpy). This means a net emissions increase of 40 tpy or more results in a major modification to a major existing source.

The plant is planning to expand its painting operation. All VOC permitted emission points at X AFB are considered one source of VOCs. X AFB is considered a major source of VOC emissions. X AFB would like to demonstrate its planned modification will not result in a net emissions increase of 40 tpy or more. Construction is scheduled to begin March 1, 1994. The first step in the netting process is to compare the increased potential to emit to the historical average emissions from the existing source over a baseline period of the most recent two years. If the most recent two year period is not representative, a different two year baseline period may be negotiated with the air pollution control authority. The data submitted by X AFB resulted in a baseline of 120 tpy. The net increase compared to this baseline is 40 tpy. This is a significant increase.

However, X AFB has a second option. X AFB may use an alternative baseline that consists of the most recent five years of emissions data that considers contemporaneous emissions increases and decreases. Contemporaneous increases and decreases result from physical changes to equipment, process changes, or other events that result in a permanent increased or decreased potential to emit. The baseline period chosen will be July 1, 1988 to June 30, 1993. The net value of increases and decreases during the baseline period is referred to as the New Source Review Balance. Since the threshold level for significant emissions increase is 40 tpy for VOCs, this balance must be offset at a ratio of 1.1 to 1 whenever the NSR balance equals or exceeds 40 tpy. After the NSR balance is offset, it becomes zero. In 1989, X AFB switched from high solvent paint to low solvent paint resulting in a reduction of 12 tons per year. There were no other changes during the baseline period. The NSR balance for the baseline period is -12. The NSR balance of -12 is then added to the net increase from the proposed modification of 40 tpy. The NSR balance becomes 28 tpy. Since the NSR balance is below the significant threshold of 40 tpy, netting is complete. X AFB will not have to offset emissions, install Lowest Achievable Emission Rate technology, or model or monitor ambient air, thus reducing the cost and time required to obtain a preconstruction permit to modify the source.

Banking and trading. This example is based on the Emission Reduction Banking rule adopted on December 17, 1992 by the San Joaquin Valley Unified Air Pollution Control District (SJVUAPCD), California. J AFB and Z AFB are both located within the jurisdiction of the SJVUAPCD. J AFB and Z AFB are located in a serious ozone nonattainment area. The offset ratio is 1.2 to 1. The significant net emissions threshold is zero. J AFB is 30 miles upwind from Z AFB.

J AFB is closing. J AFB shutdown all of its boilers effective June 1, 1993. All of these boilers were covered under J AFB's facility permit. J AFB has an accurate emissions inventory and has decided to apply for emission reduction credit. The APCA requires that all applications be submitted within 180 days from shutdown or the application is denied. The baseline period for averaging reductions is the two year period of historical average emissions immediately prior to shutdown. If this period is not representative, a different two year period may be negotiated with the regulatory agency. J AFB had the following average nitrogen oxides emissions for each calendar quarter during the baseline period:

1200 lbs, Jan 1-Mar 30
1000 lbs, Apr 1-Jun 30
600 lbs, Jul 1-Sep 30
850 lbs, Oct 1-Dec 31

Emission reductions must be real, permanent, quantifiable, and enforceable to qualify for emission reduction credit. These reductions met this criteria. The APCA confirmed the quantity of the emission reduction and must convert the emission reduction to emission reduction credit. Upon conversion to emission reduction credit, the emission reductions are reduced by ten percent. The ten percent reduction is deposited in the community bank. Therefore, J AFB will receive emission reduction credit for the following quantities:

1080 lbs, Jan 1-Mar 30
900 lbs, Apr 1-Jun 30
540 lbs, Jul 1-Sep 30
765 lbs, Oct 1-Dec 31

Trading. J AFB is planning expansion during fiscal year 94. As a result of the zero net increase emissions threshold, J AFB anticipates it will need nitrogen oxides ERCs as offsets. The APCA uses ratios to adjust the value of the ERC based on distance and wind direction between the sources involved in the ERC transfer. For sources 15 to 50 miles apart, the conversion ratio is 2 to 1. Therefore, if J AFB purchases ERCs from Z AFB, J AFB will receive ERCs in the following quantities:

540 lbs, Jan 1-Mar 31
450 lbs, Apr 1-Jun 30
270 lbs, Jul 1-Sep 30
332 lbs, Oct 1-Dec 31

if the ERCs are transferrable.

Netting. J AFB's planned expansion will result in an increased potential to emit nitrogen oxides emissions that average:

1200 lbs, Jan 1-Mar 31
1000 lbs, Apr 1-Jun 30
700 lbs, Jul 1-Sep 30
800 lbs, Oct 1-Dec 31

All of J AFB's nitrogen oxides sources are permitted as one major source of nitrogen oxides, therefore emissions from the proposed construction is considered a modification. J AFB would like to demonstrate that the proposed construction will not result in a significant net emissions increase. Construction is scheduled to begin June 1, 1994. The baseline period considers contemporaneous increases and decreases as previously stated under NSR. The period begins July 1, 1979, and ends June 30, 1994. Since the threshold value for significant net emissions increase is zero, the NSR Balance will be offset if it exceeds zero. J AFB has a zero NSR balance for the baseline period. This zero balance is added to the estimated potential to emit from the modification. This balance is

1200 lbs, Jan 1-Mar 31
1000 lbs, Apr 1-Jun 30
700 lbs, Jul 1-Sep 30
800 lbs, Oct 1-Dec 31

J AFB must offset this balance at a 1.2 to 1 ratio. J AFB must obtain ERCs for

1440 lbs, Jan 1-Mar 31
1200 lbs, Apr 1-Jun 30
840 lbs, Jul 1-Sep 30
960 lbs, Oct 1-Dec 31

J AFB may attempt to procure ERCs from Z AFB or procure ERCs from a closer facility. J AFB must consider the following distance ratios when procuring ERCs to offset emissions from its proposed modification:

same stationary source, 1 to 1
less than 15 miles, 1.2 to 1
15 to 50 miles, 2 to 1
greater than 50 miles but within the air basin 3 to 1
greater than 50 miles downwind, denied

If J AFB locates a seller of ERCs within 15 miles, it would have to purchase 1728 lbs of ERCs to get 1440 lbs based on distance ratio of 1.2 to 1.

<u>Banking</u>. The South Coast Air Quality Management District is

the air pollution control authority for the Los Angeles Basin. Los Angeles is an extreme ozone nonattainment area. It is the only ozone nonattainment area in the country classified as extreme. All applications for ERCs must be submitted within 90 days of a certifiable emission reduction or the application is denied.

The emission reductions are identical to the previous banking example from the San Joaquin Valley Unified Air Pollution Control District.

J AFB had the following average nitrogen oxides emissions for each calendar quarter during the baseline period:

1200 lbs, Jan 1-Mar 30
1000 lbs, Apr 1-Jun 30
600 lbs, Jul 1-Sep 30
850 lbs, Oct 1-Dec 31

Upon conversion to emission reduction credit, the emission reductions are reduced to the level that current Best Available Control Technology (BACT) would have reduced emissions, if current BACT was not used on the equipment. In California, BACT and Lowest Achievable Emission Rate technology are essentially equivalent. Therefore, J AFB will receive emission reduction credit based on the emissions of a new source using BACT. This method of calculating emission reduction credits creates considerable uncertainty as to what the emission reduction will be.

Summary

This chapter analyzed the application of banking, netting, and offset emissions trading policies. The management guide provided step-by-step procedures for selecting each option. Hypothetical examples demonstrated the application of netting, banking, and offsets. Background information obtained from literature, informal interviews with regulatory officials, and informal interviews with environmental managers provided the basis for the analysis and examples.

IV. Conclusions and Recommendations

Changes to New Source Review rules under the 1990 Clean Air Act Amendments (CAAA) that tightened major source emissions thresholds will make ERCs an important consideration when facilities are planning expansion in nonattainment areas. If facilities exceed these thresholds, they will be faced with a long expensive permit process. Additionally, facilities in nonattainment areas must find offsets for all emissions from major modified or new major sources. Therefore, facilities should first consider their plans for internal expansion prior to selling or trading ERCs since only ERCs generated internally may be used in netting transactions. This evaluation could be accomplished in conjunction with the update to the Base Comprehensive Plan. If new construction is classified as a major source or major modification in a nonattainment area, then ERCs are required to offset emissions. While DoD installations are one source of ERCs, restrictions on trading will not always allow procuring the ERC from another DoD installation. Therefore, facility managers should attempt to establish relationships with major civilian industrial sources in eligible trading areas. An ERC must be available at the right time, in the right amount, for the right pollutant, in an eligible trading area, from a source that is willing to sell the credit. The supply of credits will depend upon the particular air quality district, but it is safe to assume that demand for ERCs will increase. This increased demand will be driven by 1990 CAA changes which lowered major source thresholds in serious, severe, and extreme ozone nonattainment areas and increase offset ratios in all nonattainment areas.

A registry that contains information on the location, supply, demand, and availability of ERCs at DoD installations would provide a good management tool. This information would provide a mechanism for trading ERCs between DoD installations. The registry could also be used by strategic planners to assist in making decisions for selecting facilities to accommodate new missions based on ERC availability. This could be especially true in that the EPA requires each state or APCA with a banking rule to maintain a registry of ERCs on deposit (EPA, 1986:43831). However, many states do not have banking rules, therefore locating a source of ERCs without a DoD registry could be a long and expensive process in these states.

As the demand for ERCs increases, it will become more critical to identify where ERCs exist and do not exist. DoD installations can provide their own supply of ERCs in many cases. Pollution prevention, base closure and realignment, and normal equipment retirement offer opportunities to create ERCs. Restrictions on trading based on distance and wind direction will limit trading opportunities to facilities within the same air basin that meet the constraints prescribed by the air pollution control authority. Therefore, it is important that eligible sources other than DoD installations ERCs be identified. In states that have banking rules, this information may be obtained from the state registry. In states that do not have banking rules, there is no formal mechanism to determine a source of ERCs. In these states potential civilian sources of ERCs should be contained in the registry. The proposed data items for the registry are:

Location. installation or pollutant source location
Pollutant. type of pollutant
ERC Demand. the number of ERCs required
ERC Demand Date. date the ERCs are needed for a transaction
ERC Expiration Date. ERC expires if not used before this date
ERC Availability. ERCs available for trade
ERC Balance. banked ERCs in tons per year

The registry could be implemented as part of the Work Information Management System-Environmental Subsystem Air Pollution Module.

An attorney and environmental manager should be assigned responsibility for staying abreast of the rules and regulations applicable to emissions trading within each AQD where an installation is located. At a minimum, nonattainment areas should be monitored for any proposed regulatory changes. This responsibility could be assigned as an additional duty to the office of the Air Force Regional Civil Engineer. Regulations governing emissions trading are localized and dynamic. According to Young "the rules governing emissions trading may not be the same rules three months from now" (Young, 1993). Decisions concerning emissions trading are nonroutine decisions at most DoD installations. When these decisions must be made, they can have potentially high financial consequences. Therefore it is critical that DoD stay abreast of emissions trading rules and regulations.

Recommendations for Future Research

1. An evaluation the benefits of mobile source emissions trading Mobile sources are a large contributor to ozone nonattainment. The large vehicle fleets owned by DoD may provide opportunity to generate ERCs through normal vehicle retirement.

2. An evaluation of the potential economic impact of lower major source thresholds in serious, severe, and extreme nonattainment areas on planned construction at Air Force installations in those areas.

3. An evaluation of the adequacy of air emission inventories at Air Force installations. Accurate air emission inventories are essential for CAA compliance, and to quantify any ERCs that may be generated at the

installation.

4. An exploration of whether there is any benefit to coordinating pollution prevention initiatives with emissions trading. Emissions trading and pollution prevention are based on reducing pollution levels. In some cases, pollution prevention initiatives may provide the additional benefit as an ERC.

Appendix A: Glossary

Actual Emissions. The level of pollution emitted by a source. Actual emissions may differ from allowable emissions, which is the level specified in a source's permit or in the State Implementation Plan (SIP).

Air Pollution Control Authority (APCA). The public agency at the state and/or local level which has primary responsibility for implementing the Clean Air Act.

Air Quality District. The geographic area under the jurisdiction of an APCA.

Allowable Emissions. The level of emissions permitted by the terms of a source's permit or in the SIP.

Banking. This term is used to describe the process by which a firm initially reduces its emissions and applies for ERCs. The banking process continues until ERCs are extinguished through use.

Banked. This term refers to the status of an ERC after it has been certified, but before it has been used.

Bank. This term refers to the pool of emission reduction credits (ERCs) currently entered in the central registry.

Baseline. The level of emissions below which a source must reduce its emissions in order to constitute an "emission reduction."

Certificate. The air pollution control agency issues certificates representing ownership of specific ERCs which appear on the register and thus are banked. These certificates are for recordkeeping purposes and are not legally transferrable.

Conversion Ratio. The ratio is applicable to the process whereby an emission reduction is converted to an ERC. It is the fraction or percentage used to determine the number of ERCs which will be credited to an account.

Emission Offset. A regulatory device designed to allow economic growth in an area where a national ambient air quality standard has not been attained. The actual offset is obtained by securing a decrease in an existing source's emissions to compensate for emissions of a new or expanding source seeking to locate in a nonattainment area.

Emission Reductions (ERs). The physical reduction of emissions by a source. To be eligible for conversion to ERCs, this reduction must be surplus, quantifiable, enforceable, and permanent.

Emission Reduction Credit (ERC). The commodity which is "banked" and can later be used by a source to satisfy the required emission limits contained in its permit. The ERC is the end product of the conversion of emission reductions.

Minor Source. A subcategory of sources with emissions below some threshold defined by states in their SIPs.

Monitoring. The measurement and recording of emissions which occurs over time.

Nonattainment area. A geographic area designated by EPA to be in violation of national ambient air quality standards.

Permit. The emission restrictions placed by the Air Pollution Control Authority on a specific source. The permit may specify a specific emission limit, require a percent removal of a pollutant, or dictate a particular work practice.

Reasonable Further Progress. The requirement under the Clean Air Act that areas designated nonattainment achieve annual incremental steps toward satisfying ambient air quality standards by the designated deadlines.

Registry. The books in which the banking system's activities are recorded and which serve as the accounting record for the issuance and use of ERCs.

Source. A source is any building, structure, facility, or installation which emits any air pollutant. A source may include several specific emitting points, but is limited to those owned by a single legal entity.

State Implementation Plan (SIP). The legal mechanism, subject to EPA approval, by which a state proposes to achieve and maintain the ambient air quality requirements of the Clean Air Act.

Trade. The transfer or sale of ERCs from one legal entity to another in some kind of market situation subject to APCA review and approval.

Appendix B: Emission Reduction Credit Application

San Joaquin Valley
Unified Air Pollution Control District

APPLICATION FOR:

( ) EMISSION REDUCTION CREDIT (ERC)
( ) CONSOLIDATION OF ERC CERTIFICATES
( ) ERC WITHDRAWL
( ) ERC TRANSFER OF OWNERSHIP

1. ERC TO BE ISSUED TO:

2. MAILING ADDRESS:

Street/P.O. Box: ______

City: ______ State ______ Zip Code ______

3. LOCATION OF REDUCTION:

Street: ______

City: ______

4. DATE OF REDUCTION: ______

5. PERMIT NO(S): EXISTING ERC NO(S):

6. METHOD RESULTING IN EMISSION REDUCTION:
( ) SHUTDOWN ( ) RETROFIT ( ) PROCESS CHANGE ( ) OTHER
DESCRIPTION:

(Use additional sheets if necessary)

7. REQUESTED ERCs (In Pounds Per Calendar Quarter):

	VOC	NOx	CO	PM10	SOx	OTHER
1ST QUARTER						
2ND QUARTER						
3RD QUARTER						
4TH QUARTER						

8. SIGNATURE OF APPLICANT: TYPE OR PRINT TITLE OF APPLICANT:

9. TYPE OR PRINT NAME OF APPLICANT: DATE: TELEPHONE NO:

FOR APCD USE ONLY:

DATE STAMP

FILING FEE RECEIVED: $ ______

DATE PAID: ______

PROJECT NO.: ______

Southern Regional Office • 2700 M St., Suite 275 • Bakersfield, California 93301 • (805) 861-3682 • FAX (805) 861-2060

San Joaquin Valley
Unified Air Pollution Control District

APPLICATION FOR EMISSION REDUCTION CREDIT BANKING

-INSTRUCTIONS-

A. Indicate whether the application is for an Emission Reduction Credit Certificate (ERC), an ERC Withdrawal, an ERC Transfer of Ownership, or a Consolidation of ERC Certificates by marking one or more appropriate boxes.

B. A nonrefundable fee of $650 is required with each application. Checks or money orders shall be made payable to the SJVUAPCD. The District will assess reasonable additional fees based upon expenses and the average weighted labor rate if the original application fee does not cover the time and effort required to evaluate the project. You will be notified prior to the assessment of any additional fees.

C. Line 1. Indicate the name of the owner(s) that will hold title to the Certificate exactly as it should appear on the ERC Certificate. If the application is for ERC Transfer of Ownership, provide the name and mailing address of the new owner.

D. Line 2. List the mailing address where correspondence regarding the application, billing for fees, and the ERC Certificate may be sent. ERC Certificates may be picked up in person or else will be delivered by registered mail.

E. Line 3. List the physical location where the actual emissions reduction occurred. If a street address is not applicable, then provide the Township, Section, and Range or the Universal Transverse Meridian (UTM) Coordinates.

F. Line 4. Indicate the effective date that the actual emissions reduction occurred. For shutdown of a process, list the last date of operation. For equipment retrofit or modification, list the date that the project was completed. For curtailment or some other process change, list the last date of operation prior to the curtailment or change. Further information on actual emissions reductions is contained in Rule 230.1 <u>Emission Reduction Credit Banking</u>.

G. Line 5. For new ERC Certificates, if the actual emissions reduction involves emissions unit(s) with a valid Authority to Construct or Permit to Operate, list the applicable permit number(s). For ERC Withdrawal, ERC Transfer of Ownership, or Consolidation of ERC Certificates, list the applicable ERC Certificate number(s).

H. **Line 6.** Indicate whether the actual emissions reduction was generated by a shutdown, a retrofit, a process change, or by some other means by marking the appropriate box. Provide a brief narrative describing how emissions are being reduced.

I. **Line 7.** Indicate the quantities of emission reduction credits requested in pounds per calendar quarter. Actual emissions reductions are calculated according to the procedures set forth in Rule 230.1 Emission Reduction Credit Banking.

J. **Line 8.** Sign the application in ink. Type or print the title of the person signing as the applicant.

K. **Line 9.** Type or print the name of the applicant. The applicant must be an officer of the business who will be responsible for ensuring that the actual emissions reductions generated are real, enforceable, and permanent. Indicate the date and the daytime telephone number of the applicant.

L. **Supplemental Information Required With Each Application** (The following information is not required if it has already been provided in conjunction with the application for ATC(s) authorizing the reduction(s)). The following data, specifications, plans, and drawings must be submitted with each application for ERC Certificates:

1. Equipment Location Drawing or Plot Plan - The drawing or sketch submitted should be to scale and must show the following:

    a. The property involved and outlines of all buildings and structures on it. Identify all property lines plainly.

    b. The location and identification of the applicable emissions unit(s) on the property.

    c. Location of the property with respect to streets and all adjacent properties. Identify adjacent properties. Indicate the direction north on the drawing.

2. Equipment Description - For each emissions unit, state the make, model, size, type, and serial number of the entire emissions unit or of its major components.

3. Description of Actual Emissions Reduction - The application must be accompanied by a written description of the method by which emission reduction credits are generated. The descriptions must be complete and in detail for all emission reductions. For all processes which will continue to emit pollutants at a reduced level, all obtainable data must be supplied concerning the nature, volumes, particle sizes, weights, and concentrations of all types of air contaminants that may be discharged at each stage in the process. Similarly, the operation of any applicable air pollution control

equipment must be described in sufficient detail to allow the District to determine if the process can be expected to consistently operate at the proposed control efficiencies.

4. <u>Baseline Period</u> - For calculating the historic actual emissions which the actual emissions reduction will be based upon, the two year period prior to the date of reduction is used. Other periods may be applicable as defined in Rule 220.1 <u>New and Modified Stationary Source Review</u>. Data must be provided to substantiate the quantity of emissions during the baseline period. Examples of acceptable data include production records, operating records, meter readings, invoices, and receipts. The data must be presented in a format which allows emissions to be categorized by calendar quarter. For example, daily, weekly or monthly records are acceptable, but semi-annual or annual records are not.

5. <u>Emission of Air Contaminants Before and After the Actual Emissions Reduction</u> - Submit calculated estimates of the Historic Actual Emissions (HAE) of all air contaminants during the baseline period. HAE are emissions having actually occurred based on source tests or calculated using actual fuel consumption or process weight, recognized emission factors or other data approved by the Control Officer which most accurately represent the emissions during the baseline period. Submit calculated estimates of the maximum Potential to Emit (PE) of all air contaminants as a result of the actual emissions reduction. If applicable, include reference to the source of any emission factors used, and include any test data which was collected and analyzed by independent laboratories and used to support the calculations.

6. <u>Process and Instrumentation Flow Diagram</u> - For continuous processes, show the flow of materials and the location and type of all instrumentation, including any stack gas monitors. Show all pertinent temperatures, pressures, volumetric flow rates and mass flow rates.

7. <u>Equipment Drawings</u> - For equipment retrofits or modifications, provide drawings, dimensioned and to scale, in plan, elevations and as many sections as are needed to clearly illustrate the design and operation of the emissions unit(s) and the means by which air contaminants are controlled. When standard commercial equipment will be utilized for part or all of an emissions unit, the manufacturer's catalogue describing the equipment may be submitted. Information not contained in the catalogue must be provided by the applicant.

Appendix C: Management Guide

Introduction

This section proposes a management guide to assist environmental managers in making decisions when considering the banking, netting, or offset alternatives. The guide provides step-by-step procedures for selecting each alternative.

Emission increases that result from new major sources and modifications to existing major sources may require emissions offsets. Emissions offsets are decreases in emissions to offset the proposed emissions increase from a new or modified major source. Emission offsets must be greater than the proposed emissions increase. The decision process for determining whether emissions offsets are required is outlined beginning with Figure 1 continuing to Figure 4. Each figure is followed by step-by-step instructions to guide the user through each alternative.

Netting may be an option for existing major sources undergoing modification. Netting is a bookeeping mechanism that tracks emissions increases and decreases from modifications to major sources to determine whether a significant net emissions increase will result from the modification (ETI, 1993:63). By considering certain emissions decreases, the modification may avoid being classified as a major modification. If the modification is not considered major, the time required to obtain a permit to construct is shortened and the cost of the permit process is reduced. The decision process for netting begins with Figure 1 continuing to Figure 2.

Banking provides a mechanism for saving certain emission reductions for future use in offset or netting transactions. The types of emission reductions that usually qualify for banking are outlined in the banking procedures at Figure 3.

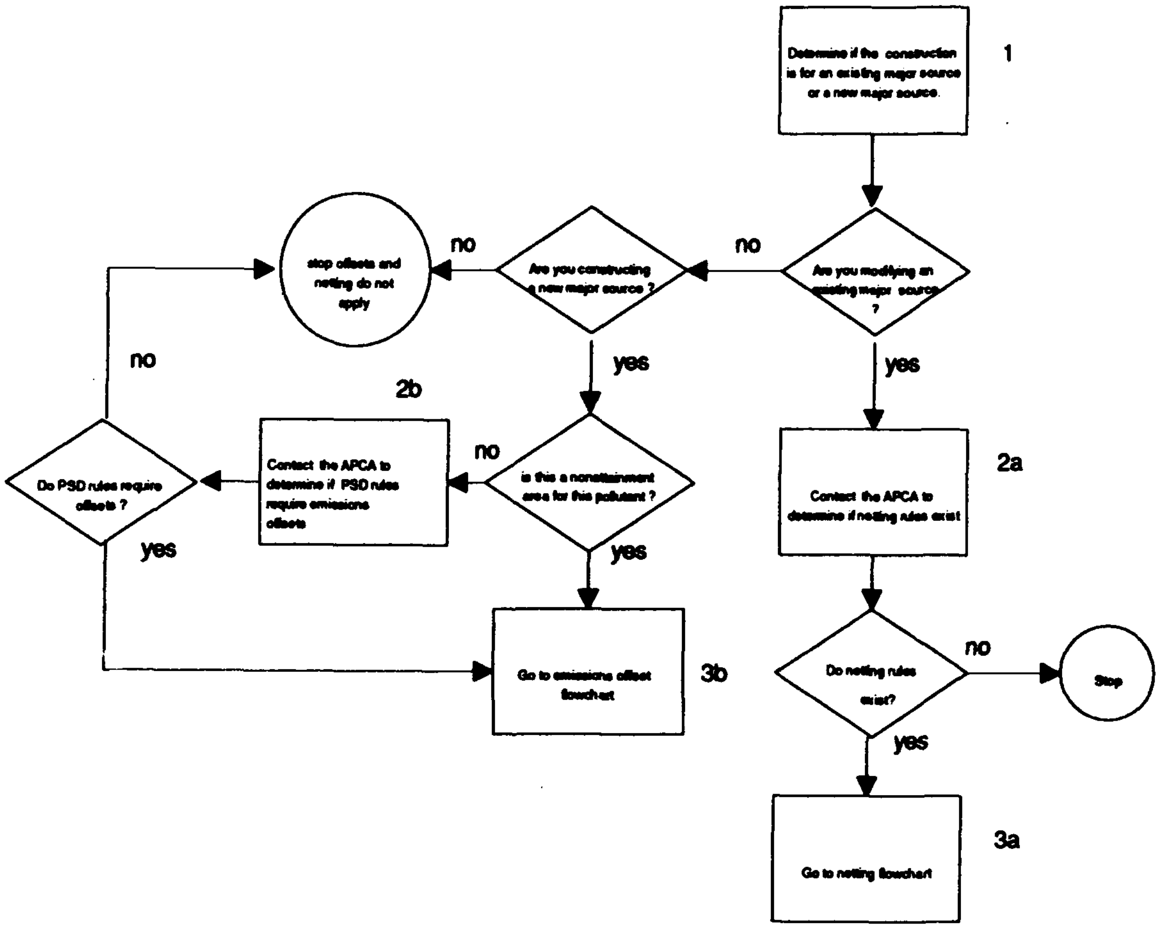

Figure 1. Emissions Increase Flowchart

Step 1. Determine if the source is a new major source or an existing major source. If the source is not a new major source or an existing major source, offsets and netting do not apply.

Step 2a. Contact the APCA to determine if netting rules have been adopted. If netting rules have not been adopted, determine what permitting procedures the APCA requires. If netting rules have been adopted, continue to the netting flow diagram.

Step 2b. Determine if this is a nonattainment area for the pollutant(s). If not go to step 3.

Step 3. Contact the APCA to determine if Prevention of Significant Deterioration (PSD) rules require offsets. EPA does not require offsets in attainment areas, but states have the option to require offsets.

Step 4a. Go to netting flowchart.

Step 4b. Go to offset flowchart.

The decision process for netting is outlined in figure 2.

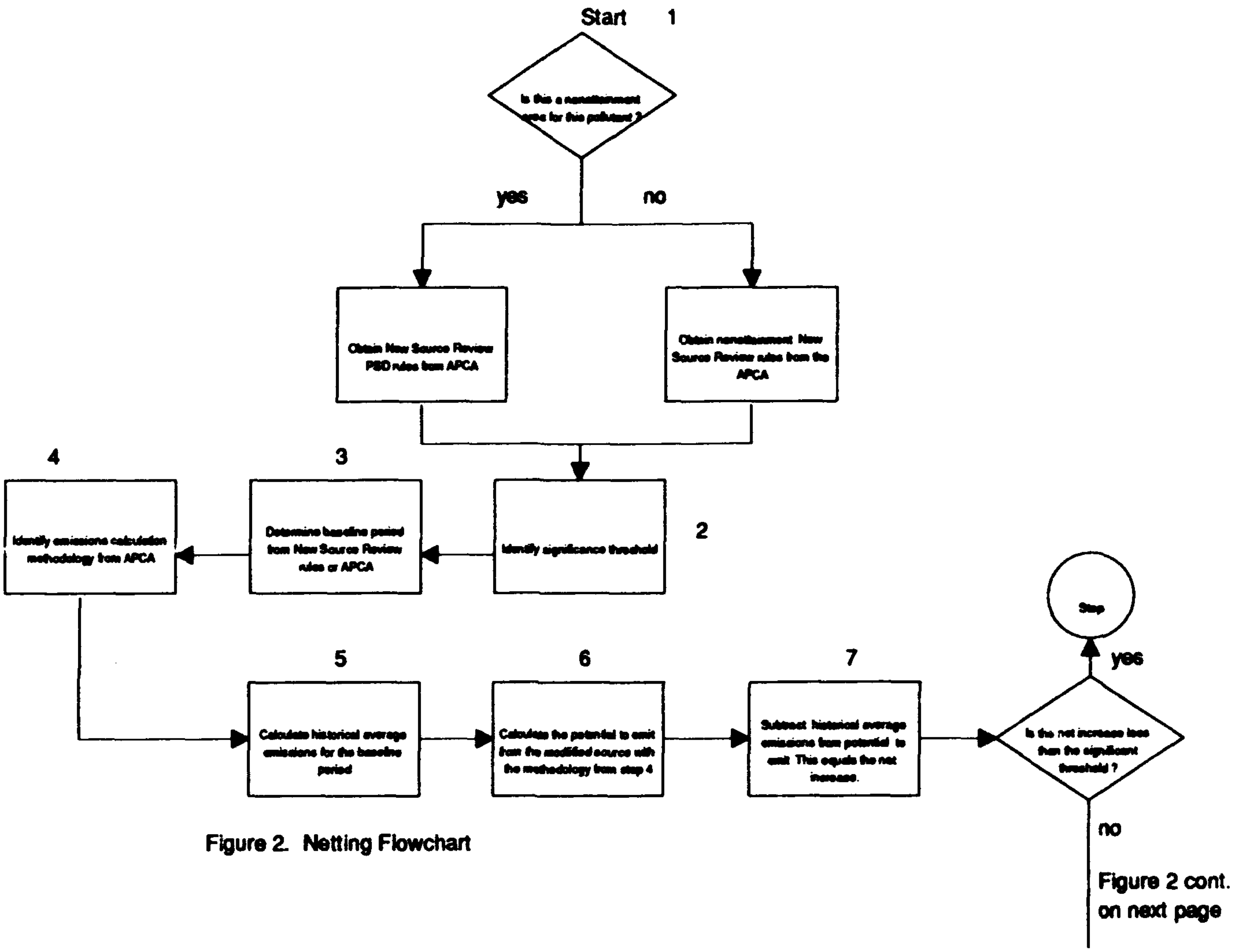

Figure 2. Netting Flowchart

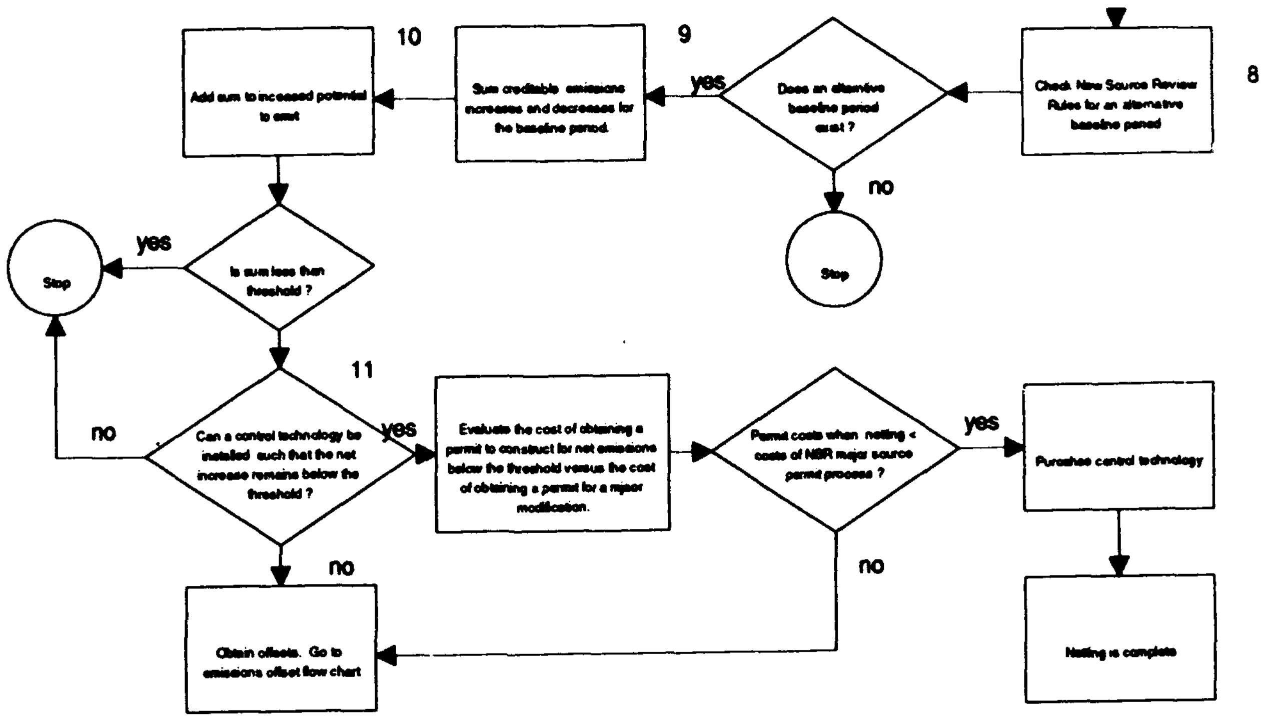

Figure 2. Netting Flow Chart

The netting process contains the following steps.

Step 1. Obtain New Source Review rules for attainment or nonattainment depending on the nonattainment/attainment status of the area for the particular pollutant.

Step 2. Identify the significance threshold. If the net emissions increase equals or exceeds this threshold, the modification is major.

Step 3. Determine the baseline period. The potential to emit from the modified source will be measured against the historical average emissions for this period.

Step 4. The APCA determines how the emissions will be calculated for the historical emissions baseline and the potential to emit from the modified source.

Step 5. Calculate the historical average emissions for the baseline period.

Step 6. Calculate the potential to emit from the modified source with the emissions calculation methodology prescribed by the APCA.

Step 7. Subtract the historical average emissions for the baseline period from the potential to emit. If the net increase is less than the threshold the modification is not considered major, therefore the netting process is complete. If the potential to emit equals or exceeds the threshold, an alternative baseline period may or may not be an option.

Step 8. Check the New Source Review rules for an alternative baseline period. If an alternative baseline is not an option, the netting process is complete. The modification is major.

Step 9. Sum creditable emissions increases and decreases for the baseline period. Creditable increases are emissions increases from past modifications or other events which resulted in a permanent emissions increase.

Creditable decreases include emission reduction credits and other decreases (i.e. taking equipment offline, process changes, fuel switches). The APCA should have a record of all creditable increases and decreases.

Step 10. Add the sum of step 9 to the increased potential to emit from step 6. If the sum is less than the threshold, the modification is not major and the netting process is complete.

Step 11. A pollution control technology may be available that reduces the net emissions increase below the significant threshold. If a control technology is available, the costs of obtaining a permit to construct, including installing this technology, should be weighed against the cost of obtaining a permit to construct for a major modification. If the net increase equals or exceeds the significance threshold, Best Available Control Technology (BACT) in attainment areas, and Lowest Achievable Emissions Rate (LAER) technology in nonattainment areas will be required by the APCA to obtain a permit for a major modification to an existing source. It may be beneficial to install a control technology even BACT or LAER to avoid the additional costs of modeling, monitoring, and preconstruction delays associated with obtaining a permit to construct for a major modification.

Certain emission reductions may qualify for emission reduction credit (ERC) and may be banked for future use. The decision process for selecting this alternative is outlined in figure 3.

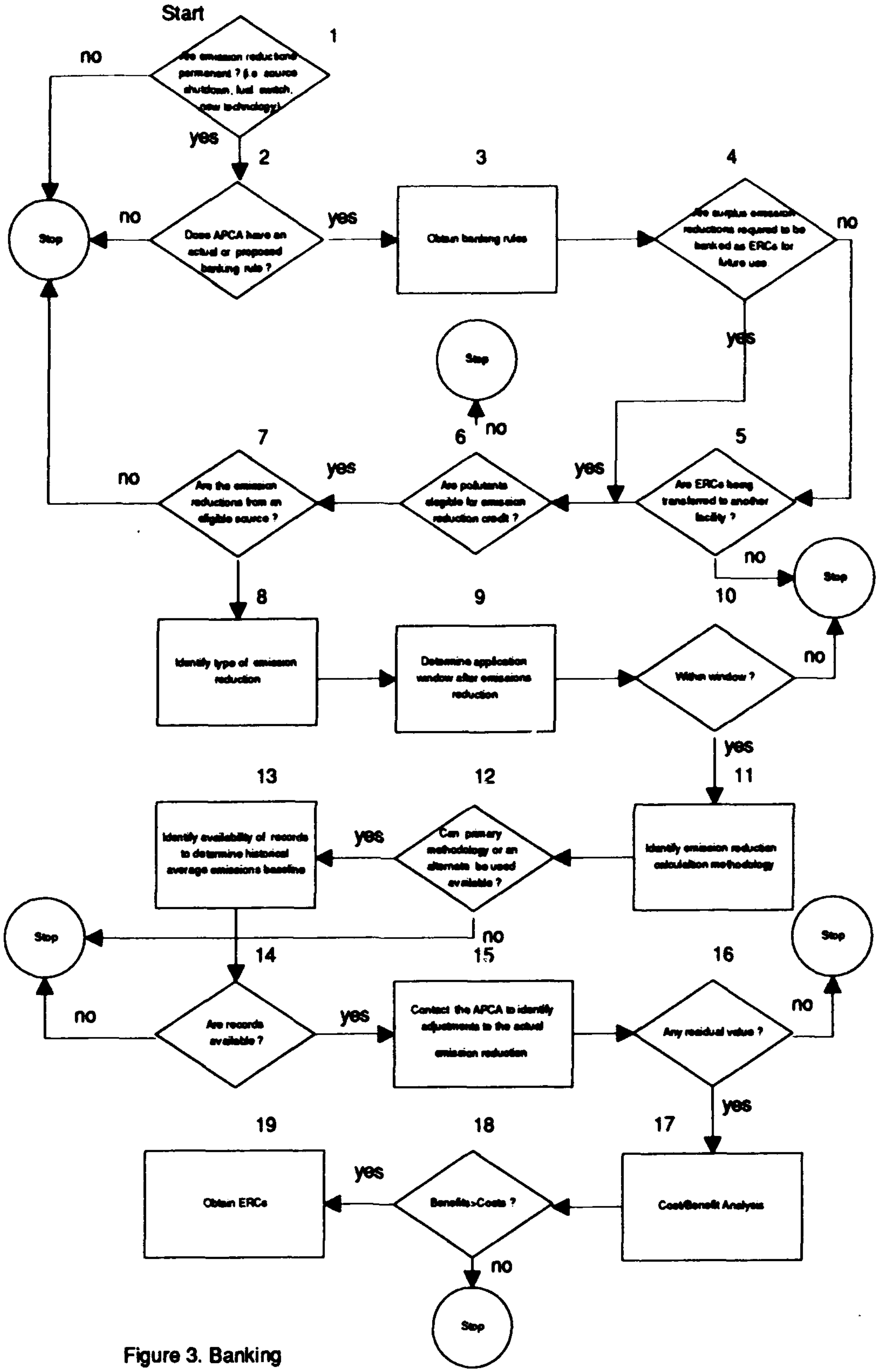

Figure 3. Banking

Step 1. Permanent emission reductions result from, but are not limited to, events such as source shutdown, equipment upgrades, pollution abatement equipment, and or permanent reductions in operating hours. If the emission reduction is permanent it may be eligible to banked as an emission reduction credit (ERC).

Step 2. Determine if the APCA has a banking rule.

Step 3. Obtain the banking rules.

Step 4 and 5. Surplus emission reductions are not always required to be banked for future use in netting transactions, but are almost always required to be banked for transfer to another facility. If surplus emission reductions are not required to be banked for future use, and are not going to be transferred to another facility as ERCs, there is probably no need to pursue banking.

Step 6. Pollutants must be eligible to receive emission reduction credit. This information can be obtained from the banking rule.

Step 7. Emission reductions must be from an eligible source as determined by the APCA.

Step 8. The type of emission reduction must be identified. Some examples are source shutdown, fuel switch, process changes, and a permanent reduction in equipment operating hours.

Step 9 and 10. Applications for emission reduction credits must be submitted within the timeframe specified by the APCA after the emission reduction.

Step 11 and 12. The APCA must approve the methodology for calculating the reduced potential to emit and the methodology for calculating the average emissions baseline.

Step 13 and 14. Based on the approved methodology, records must be available to calculate the historical average emissions baseline.

Step 15 and 16. The emissions reduction may be reduced beyond the actual emissions reduction. Adjustments may be made by applying a more stringent control technology than was used on the equipment, resulting in an emissions reduction less than the actual emissions reduction.

Step 17 and 18. Evaluate the costs of obtaining the emission reduction credits versus the benefits derived from the use of the emission reduction credits. Costs include the cost of time to prepare the application, application fee, and other administrative costs determined by the application process of the specific APCA.

Figure 4 outlines the decision process for emissions offsets.

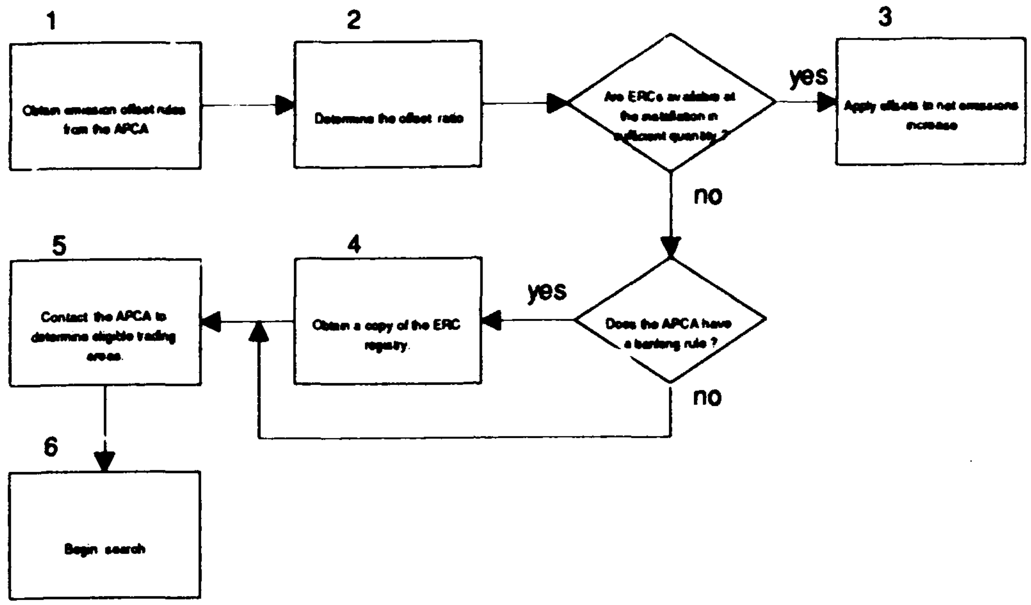

Figure 4. Offset Flow Chart

Step 1. Obtain emissions offset rules from the APCA.

Step 2. Determine the offset ratio. The offset ratio determines the ratio of emissions increase to emissions decrease required to receive a pre-construction permit. Emissions decreases must be greater than emissions increases.

Step 3. Apply the offsets to the net emissions increase. An offset ratio of 1.3 to 1 would result in required offsets of 1300 pounds of ERCs for 1000 pounds of net emissions increase.

Step 4. Obtain a copy of the ERC registry. All states with a banking rule are required by EPA to maintain a registry. The registry is a listing of emission reduction credits by location.

Step 5. Trading may or may not be restricted to certain areas. Contact the APCA to determine eligible trading areas.

Step 6. Begin search.

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This research develops a management guide for assisting environmental managers in selecting the emissions trading alternatives of netting, offsets, and banking. The basis for this management guide was information collected from literature on Clean Air legislation and informal interviews with regulatory officials. The goal of this research was to provide environmental managers with a tool to select alternatives to current command and control regulations that may lower air pollution control costs in certain situations.

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